

**CLAIMS**

1. A solder ball filling apparatus comprising:
  - a base plate provided with a ball grid array template on one end having a plurality of locating holes extending therethrough for receiving solder balls, the base plate having pivotal movement about a pivot between a first pivot direction to move solder balls toward the ball grid array template and a second, opposite pivot direction to move solder balls away from the ball grid array template;
  - a solder ball supply bin provided on the base plate for holding solder balls therein and for depositing solder balls in one or more of the locating holes when the bin is located above the ball grid array template; and
  - a motor capable of moving the solder ball supply bin along the base plate toward and away from the ball grid array template.
2. A solder ball filling apparatus as claimed in claim 1, wherein the solder ball supply bin comprises two oppositely disposed side walls respectively connected by a rear side wall at one end and a pivoted ball gate at an opposite end, wherein during pivoting of the base plate in the second direction, the ball gate pivots upon contact with solder balls that have not moved away from the ball grid array template.
3. A solder ball filling apparatus according to claim 2, wherein the rear side wall is disposed at a distance relative to the pivoted ball gate such that when the bin slideably moves on the base plate the rear wall does not slide over the ball grid array template.
4. The apparatus according to claim 2, further comprising a sensing device positioned at both the ends of the base plate, at a height similar to the height of the pivoted ball gate from the base plate.
5. The apparatus according to Claim 4, wherein the sensing device is a through-beam sensor or a focused-beam reflective sensor.
6. The apparatus according to Claim 1, wherein the base plate is pivoted at an angle ranging from 5 to 40 degrees in the first pivot direction.

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7. The apparatus according to Claim 1, wherein the base plate is pivoted at an angle ranging from 20 to 75 degrees in the second pivot direction.
8. The apparatus according to Claim 1, wherein the locating holes in the ball grid array template are in communication with a vacuum.
9. A method of filling a ball grid array template with solder balls, the ball grid array template being provided on one end of a base plate and having a plurality of locating holes extending therethrough, the base plate being capable of pivotal movement between a first pivot direction and a second, opposite pivot direction, and a solder ball supply bin being provided on the base plate that is capable of sliding thereon in the first and second pivot directions, the method comprising:
  - (a) providing solder balls in the solder ball supply bin;
  - (b) pivoting the base plate in the first pivot direction to allow solder balls located in the bin to move in the first pivot direction;
  - (c) moving the solder ball supply bin over the base plate in the first pivot direction to the ball grid array template to thereby allow solder balls to fill one or more of the locating holes;
  - (d) pivoting the base plate in the second pivot direction to allow solder balls located in the bin to move in the second pivot direction away from the ball grid array template; and
  - (e) moving the solder ball supply bin over the base plate in the second pivot direction.
10. The method according to claim 9, wherein the bin is capable of holding solder balls between two oppositely disposed side walls respectively connected by a rear side wall at one end and a pivoted ball gate at an opposite end, wherein during step (e) the ball gate pivots upon contact with solder balls that have not moved away from the ball grid array template.
11. The method according to Claim 9, wherein the base plate is pivoted at an angle ranging from 5 to 40 degrees in the first pivot direction.
12. The method according to Claim 9, wherein the base plate is pivoted at an angle ranging from 20 to 75 degrees in the second pivot direction.

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13. The method according to Claim 9, further comprising pivoting the base plate to a horizontal position after step (e).
14. The method of Claim 9, wherein the first pivot direction is a clockwise direction.
15. The method of Claim 9, wherein the second pivot direction is an anti-clockwise direction.

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